FISSURAL DIAGRAMS.

B. G. WILDER.

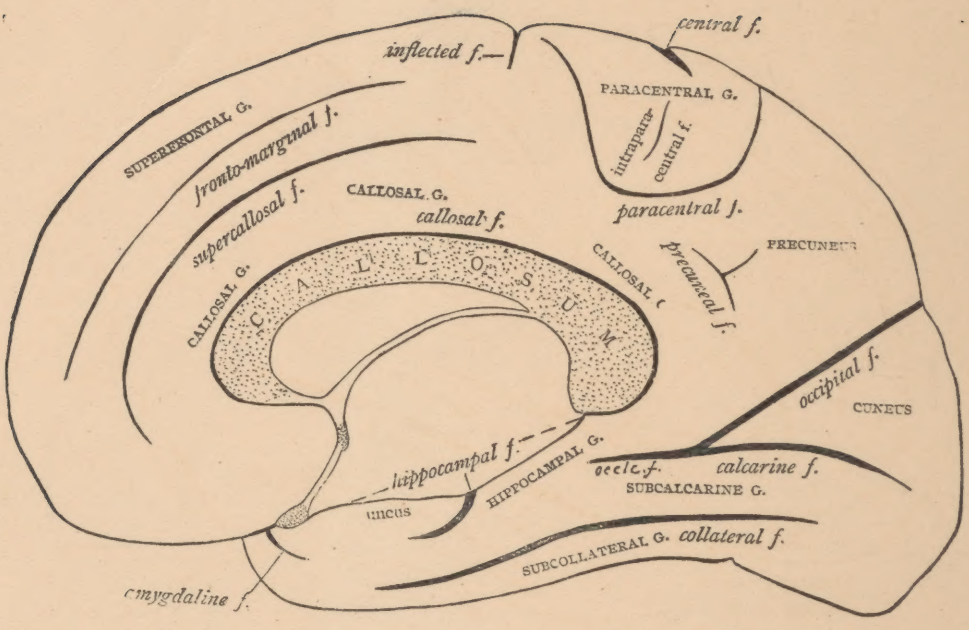

FIG. 7. MESAL ASPECT OF THE RIGHT HEMICEREBRUM.

DIAGRAMS OF THE FISSURES OF THE HUMAN BRAIN.

Illustrating Lectures XVIII and XX in the course in Physiology at Cornell University, December, 1891, by Prof. B. G. Wilder.

The outlines and the locations of the principal fissures are derived from photographs of the cerebrum of a mulatto (No. 322 in the Museum of Cornell University) which was hardened within the cranium by injection of alcohol. The figures are about four-fifths the diameter of the original. For comparison were employed 120 hemicerebrums, 80 adult and 40 young or fœtal. The diagrams are substantially reproductions (by courtesy of the publishers) of Figs. 4768 and 4769 in the writer's article "Macroscopic Anatomy of the Brain," in Wood's Reference Handbook of the Medical Sciences, VIII, (1889), but the broken lines, braces and names indicating the commonly accepted subdivision into lobes have been omitted on account of the writer's increasing doubts as to the value of such demarcations.

ABBREVIATIONS.—A, angular gyrus; M, marginal (or supramarginal) gyrus; *f*, fissure; *g*., gyrus; *preop*., preoperculum; *occlc*., occalcarine fissure, for occipito-calcarine, the common stem of the two fissures demarcating the cuneus. The interrogation points near the caudal end of the lateral aspect indicate the writer's doubts as to whether there are any constant fissures in the places of the lines, and if so as to what they should be called.

As is at present usual in collections, most of the specimens available for study came from ignorant, insane, or criminal persons; it must be borne in mind that the *fissural pattern of the average, intelligent, educated, and moral human being is undetermined.* Hence, although these are believed to be improvements upon previous diagrams, they must be regarded as provisional and imperfect.

It is hoped that this and succeeding classes may include some who will recognize the desideratum above indicated and will follow the enlightened example of several graduates and professors of this University in giving written directions to the effect that their brains shall be saved for high scientific uses rather than wasted upon worms. Steps have been taken toward the formation of a Cornell Brain Association, and similar organizations might well be established at other institutions of learning and in many cities.

The fissure-lines are usually unbranched and without contortions; this is warranted by the early condition of the fissures and simplifies the diagrams; it is as if, on a map, the brooks, swamps and pools were omitted and the rivers straightened out.

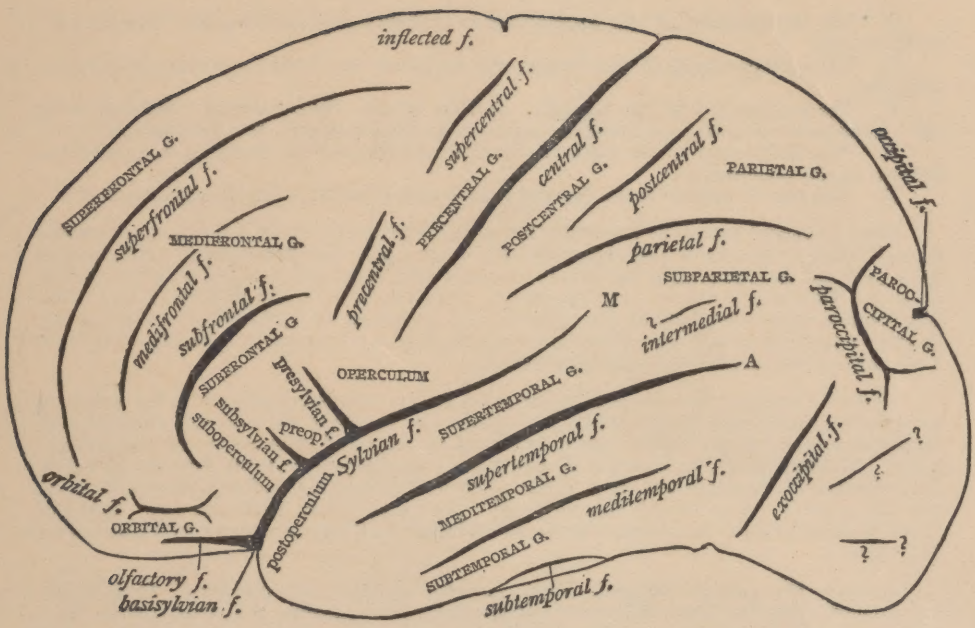

FIG. 8. LATERAL ASPECT OF THE LEFT HEMICEREBRUM.

The widths of the fissure-lines are intended to indicate the writer's present ideas respecting the relative constancy and depth of the fissures; but for the most part provisionally and approximately.

Fissure-lines are connected only when the fissures are always or nearly always connected in the adult.

Fissure connections are of two kinds, *viz:* (*a*) invariable, primary and apparently inevitable from the mode of formation; *e. g.*, of the callosal with the hippocampal; of the Sylvian with the presylvian and subsylvian: (*b*) almost invariable, but secondary, *e. g.*, of the occipital and calcarine.

The following connections are so common in the adult that they might perhaps be represented advantageously by interrupted lines:—supercallosal and paracentral; precentral and supercentral; parietal and postcentral; parietal and paroccipital.

The following connections are not uncommon:—superfrontal and supercentral; subfrontal and precentral.

The entrance of the central or the precentral into the Sylvian by indentation of the margin of the operculum is comparatively infrequent.

The following fissures are inconstant: fronto-marginal; intermedial; intraparacentral; medifrontal; precuneal; exoccipital; subtemporal: also the following, not represented on the diagrams:—adoccipital; episylvian; hyposylvian; orbito-frontal; postcalcarine; preparoccipital; postparoccipital; subcentral; transtemporal; these nine inconstant fissures are figured or described in the Reference Handbook, VIII.

The *insula*, ("island of Reil") does not appear; it is a subgyre, concealed by the supergyres constituting the lips of the Sylvian fissure. The more or less distinct furrow about the base of the insula is the *circuminsular fissure*. The *transinsular fissure* demarcates the cephalic portion, *preinsula*, from the caudal, *postinsula*.

From Ecker's diagrams these differ mainly in the following respects:

A. The omission of branches and corrugations.

B. The inclusion of the callosal, inflected, amygdaline, medifrontal, precuneal, postcentral and subtemporal fissures.

C. The disjunction of the supercallosal from the paracentral, and of the precentral from the subfrontal.

D. The introduction of the exoccipital as probably representing the "ape-fissure" of Wernicke.

E. The interpretation of the "transverse occipital" as merely a portion of the paroccipital.

F. The recognition of the occipital portion of the "intraparietal," together with the "transverse occipital," as constituting an independent fissure, the paroccipital.

G. The designation of the variously constituted stem of the occipital and calcarine fissures as the occalcarine.

H. The use of italics for the fissural names and of capitals for the gyral names.

Upon previous occasions the writer has urged the desirability of monographic studies of each fissure, even more complete than his own upon the paroccipital (see No. 9 of subjoined list) and the central (see No. 12 in which about two quarto pages are given to that fissure). That suggestion is here repeated; notwithstanding the papers of D. J. Cunningham in recent numbers of the *Journal of Anatomy and Physiology*, there is no fissure respecting which our information is complete, and concerning nearly all there is very much to be ascertained and interpreted.

Fissural and gyral names.—In a few cases it has seemed desirable to the writer to introduce entirely new terms, but he has endeavored to adopt from various authors such names as seemed at once most appropriate anatomically and most acceptable etymologically. Mononyms are preferred to dionyms, and especially locative mononyms in which the adjectives indicating relative position are replaced by prefixes of similar significance; see the article, "Anatomical Terminology," Ref. Handbook, VIII, 524–525. Many of these locative fissural mononyms were introduced by Owen, Anatomy of Vertebrates, III, 135–137.

Among the terms adopted from various writers are *collateral* from Huxley; *fronto-marginal* from Wernicke; *intermedial* from Jensen; *preoccipital* from Meynert; *inflected* from Lussana; *precentral* and *postcentral* from Schwalbe; *callosal, hippocampal, supercallosal, medifrontal and subfrontal* from Owen; *occipital* (for *occipito-parietal* and *parieto-occipital*), and *parietal* (for *intraparietal*) from Pansch. Many of the names adopted or suggested by the writer were employed by Dr. C. K. Mills in his presidential address before the American Neurological Association in 1886.

*The writer has availed himself of nearly all fissural literature and has published the following upon the subject:

1. The outer [lateral] cerebral fissures of Mammalia (especially the carnivora) and the limits of their homologies. *Amer. Assoc. Proc.*, 1873; XXII, Part II, pp. 214–234, 19 figs.
2. Cerebral [fissural] variation in domestic dogs. Ibid. pp. 234–249; 6 figs.
3. Lateral symmetry in the brains [fissures] of a double human monster. Ibid. pp. 250–251; 4 figs.
4. The cerebral fissures of the domestic cat. *Science*, I, 49–51; 2 figures; 1880.
5. The brain of the cat. *Amer. Philosoph. Society Proc.*, XIX, 1881. [Figures 1–6 and pages 547, 551 refer to fissures].
6. Anatomical Technology, 1882 and 1886. [Fissures are considered on pp. 494–503].
7. On the alleged homology of the carnivoral *Fissura cruciata* with the primatial *F. centralis*. *Amer. Neurol. Assoc. Trans.*, 1883. *Jour. Nerv. and Mental Dis.*, N. S., VIII. 62–63.
8. On two little known cerebral fissures, with suggestions as to fissural and gyral names. Ibid. 1885. N. S., X, 350–352.
9. The paroccipital, a newly recognized fissural integer. *Jour. Nerv. and Mental Dis.*, N. S., XI, 301–315; 5 figs.
10. The paroccipital fissure. Letter to the editor. *N. Y. Medical Record*, Oct. 2, 1886.
11. Human cerebral fissures, their relations and the methods of studying them. *Amer. Naturalist*, Oct. 1886, 3 pages, 2 figures.
12. Article, The gross anatomy of the brain. Wood's *Ref. Handbook of the Medical Sciences*, VIII, 1889. [Pp. 147–162 and figures 4758–4788 refer to fissures].
13. Comparative anatomy of the human and simian brain. Philosophical Society of Washington, D. C., April 14, 1890. (*Unpublished*).
14. The subfrontal gyre in man and apes. Address before the Alumni Association of the Medical Department of the Niagara University, 1890. See *Buffalo Med. and Surg. Journal*, May, 1890, p. 648.
15. Remarks on the brain of Chauncey Wright. *Amer. Neurol. Assoc. Trans.*, 1890. *Jour. of Nerv. and Mental Dis.*, Nov. 1890, pp. 2.
16. Exhibition of diagrams of the brains and medisected heads of man and a chimpanzee. *Amer. Assoc. Proc.* 1890, p. 375. Abstr. in *Amer. Naturalist*, Oct. 1, 1890, 980.
17. Exhibition of diagrams illustrating the formation of the human Sylvian fissure. *Amer. Assoc. Proc.*, 1890, p. 346.
18. Recent fissural diagrams. *Assoc. of Amer. Anatomists, Records*, 1891.